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EXAMINER

PHAM, THANH V

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/044,162
Filing Date: January 11, 2002
Appellant(s): MOSTAFAZADEH ET AL.

Steve D. Beyer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/26/2006 appealing from the Office action mailed 06/29/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. The statement, "Claims 11, 13, 18, 26 and 38 also stand rejected under 35 USC 112, first paragraph" should be deleted because there is no rejection under 35 USC 112, first paragraph in the Final office action mailed 06/29/2006 and there is no such a claim as 18, 26 or 38.

A correct statement of the status of the claims is as follows:

Claims 1 and 4-15 are pending and subjected to this appeal. Claims 2-3 have been canceled. Each of the pending claims stands rejected under 35 USC 103.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,200,362	Lin et al.	4-1993
5,252,855	Ogawa et al.	10-1993
5,844,315	Melton et al.	12-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 4-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. US 5,200,362 in combination with Ogawa et al. US 5,252,855.

Re claim 1, the Lin et al. reference discloses a method for producing an electrical device (figs. 1-5 and 9) comprising the steps of:

forming a flat lead frame 13 including a plurality of leads extending radially from a central (fig. 9), the lead frame having opposing upper and lower surfaces (col. 2, lines 51-54);

mounting the lead frame 13 and an integrated circuit die 15 onto a strip of adhesive tape 12 such that the die is located in the central, and the lower surface of the lead frame contacts the adhesive tape (fig. 2);

electrically connecting bond pads on a top surface of the die to associated lead frame leads using wire bonding 18;

forming a plastic casing 20 over an upper surface of the die and the upper surface of the lead frame wherein the plastic casing (comprising molding plastic onto the upper surfaces of the die and the lead frame, *re claim 6*) comes into contact with the adhesive tape such that a lower surface of the plastic casing is substantially co-planar with the lower surfaces of the lead frame (fig. 3, col. 3, lines 13-32); and

removing the adhesive tape 12 after forming the plastic casing to expose the lead frame, whereby exposed surfaces of the lead frame directly form the only externally exposed and accessible I/O contacts for the package and plastic material fills at least portions of gaps between adjacent leads, such that the lower surface of the package is substantially co-planar and includes exposed portions of the plastic casing and the lead frame (fig. 4, col. 3, lines 33-38 and col. 4, lines 55-62).

Re claim 4, wherein the step of forming the lead frame comprises etching a metal sheet, "conventional photolithographic patterning and etching", "in yet another embodiment, a pattern of traces is formed *from* a thin sheet of metal" (col. 2, lines 37-38 and 51-52).

The Lin et al. reference does not clearly state use of a lead frame *with a central opening*, though it discloses “no thick device “header” or lead-frame is necessary for mounting the device die”, (col. 3, lines 56-57).

The Ogawa et al. reference discloses a method of packaging an integrated circuit, fig. 5, comprising:

providing a lead frame including a plurality of leads 1 *and a central opening*, the lead frame is made by punching (*re claim 5*) or by etching (*re claim 4*) a plate composed of a copper alloy or an iron alloy (col. 1, lines 13-16) having opposing upper and lower surfaces;

mounting the lead frame 1 and an integrated circuit die 4 onto a strip of adhesive tape 2 as element mounting member such that a lower surface of the die contacts the adhesive tape and the die is located in the central opening and the lower surface of the lead frame also contacts the adhesive tape such that the lower surface of the die and the lower surface of the lead frame are substantially co-planar;

electrically connecting bond pads on a top surface of the die to associated lead frame leads with thin metal wire 5 with the adhesive tape in place such that the adhesive tape holds the die and lead frame in place during the wire bonding operation (fig. 5 and col. 4, line 66 to col. 5, line 20).

The Ogawa et al. reference does not teach forming a plastic casing over an upper surface of the die and the upper surface of the lead frame, and removing the adhesive tape after molding the plastic casing.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of Lin et al. with a lead frame with a central opening of Ogawa et al. because the lead frame of Ogawa et al. would provide the formed package of Lin et al. with the die being hold during electrical connection and a thinner thickness product.

Alternatively, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of Ogawa et al. with a plastic casing because the plastic casing would provide the process of Ogawa et al. with complete semiconductor package device.

The combination using a flat lead frame with central opening would produce *an encapsulated semiconductor die package* wherein the molded plastic casing comes into contact with the adhesive tape such that a lower surface of the plastic casing is substantially co-planar with the lower surfaces of the lead frame *and the die*; and removing the adhesive tape after molding the plastic casing would expose the lower surfaces of *the die* and the leads, whereby exposed portions of the leads form *the only external accessible I/O contacts for a resulting integrated circuit package* and plastic material fills at least portions of gaps formed between adjacent leads such that the lower surface of the package is substantially co-planar and includes exposed portions of the plastic casing, the lead frame and the die.

Re claim 7, the above combined method discloses all claimed limitations.

Re claim 8, the formed encapsulated semiconductor die package by the combination which results in no die-support element would provide the lower surface of

the die being in direct contact with a heat sink formed on the circuit board when mounted on a circuit board. (*The Lin et al. reference discloses (col. 3, lines 50-63) "exposed on one side of the resin body are portions of one side of the pattern of conductive traces 13. These conductive traces can be directly contacted for making electrical contact to the semiconductor device die", "device die 15 is mounted, can be contacted by a heat sink (not shown) in order to conduct heat away from the die during operation".*)

Re claims 9-10 and 13-14, the Lin et al. reference further discloses (claim 5 or col. 4, line 30) "traces may be coupled together with solder bumps" so that it can be mounted on a circuit board.

Re claims 11-12 and 15, the Lin et al. reference further discloses (col. 4, lines 63-65) "either before or after the transfer film is removed, the traces can be severed along the lines 54 to electrically disconnect the individual devices". Based on this passage and figs. 5 and 9, the leads are trimmed and the peripheral portions of the leads are flush or substantially flush with side surfaces of the plastic casing.

3. Note: Appellant is advised that should claim 9 be found allowable, newly added claim 14 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). In this instance, throughout the arguments of record, the

limitation of "the exposed lower surfaces of the leads" in claim 14 is not different from the limitation of "the exposed portion of the leads" in claim 9.

(10) Response to Argument

Lin does not disclose a lead frame (pages 4-6)

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this instance, the rejection is a two way combination; one is by Lin in view of Ogawa and the other is by Ogawa in view of Lin.

Lead frame commonly composed of 3 parts, the ring, the die support and leads. Appellant quotes Lin's col. 3, lines 56-57 that "no thick device "header" or lead frame is necessary for mounting the device die, and so the thickness "t" is minimized" to support for the argument that Lin teaches away from the use of a lead frame. This argument is respectfully traversed because, although not taught as a preferred embodiment, Lin teaches this embodiment nonetheless, and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 169 USPQ 423 (CCPA 1971). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." *In re Gurley*, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including

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nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). Even a teaching away from a claimed invention does not render the invention patentable. See *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed." To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention for another purpose.

Appellant is directed to Lin's col. 2, lines 37-38 and 51-52 wherein the step of forming the lead frame comprises etching a metal sheet, using "conventional photolithographic patterning and etching", "in yet another embodiment, *a pattern of traces is formed from a thin sheet of metal*". And Ogawa's col. 1, lines 13-17 wherein "a lead frame for use in a semiconductor package is made by punching with a pressing machine or by etching of a plate material composed of a copper alloy or an iron alloy. In other words, a lead frame to be used in one semiconductor package is constituted with a single kind of metal". In comparison with instant col. 1, lines 23-24, "lead frame 20 is etched or stamped from a thin metal strip to form a pattern of narrow leads 22", the three definitions of lead frame are not different with each other.

Further, the quote in the quote from Lin that "no thick device "header" or lead frame is necessary for mounting the device die, and so the thickness 't' is minimized" is

given *the benefit of the doubt* by the examiner wherein the term “header” that goes along with “lead frame is (no) necessary for mounting the device die” could be understood as the ‘header’ or the ‘part’ of the lead frame that used for mounting the device die is not needed. Therefore, the rejection is made under 35 USC 103 (the teaching of Lin with Ogawa’s lead frame *clearly* without die-support element) instead of under 35 USC 102.

Appellant’s argument on self-supporting frameworks of skirts, tie bars, rails and/or other structures is irrelevant because those elements are not claimed. Further, the one thing that supports the lead frame’s conductive leads and the die during wiring and assembling steps in instant invention is the strip of adhesive tape or transfer film which taught by Lin’s element 12 and Ogawa’s element 2. Furthermore, this structure of Lin’s col. 2, lines 51-54 is well-known in the art as in previously used reference US 5,844,315 to Melton et al.’s figs. 1-2 and col. 2, lines 40-60 wherein the leads, the rail, the skirt/outer ring *and/or other structures* are support by element 38 which is “formed of a flexible polyimide tape having an adhesive coating for temporarily securing integrated circuit die 12 and lead frame 22 during processing, and permits the molding support 38 to be easily removed from the product microelectronic package (this reference being mentioned to as evidence of Lin’s “pattern of traces is formed from a thin sheet of metal and that pattern of traces is then laminated to the transfer film” is the identical and analogue to a well-known “lead frame” in prior art; this reference will be mentioned again in the response to argument on Ogawa below as evidence of adhering tape being removing performed in prior art).

In response to appellant's argument (pages 6-8) that a person of ordinary skill in the art would not be motivated to replace the thin film foil described by Lin with the lead frame of Ogawa, the fact that appellant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

The response to appellant's argument of Lin's teaching away from the use of a lead frame is same as above.

In response to appellant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the combination uses the Lin reference for further step of plastic casing and the Ogawa reference for the no die support element lead frame.

The rejection using Ogawa as the primary reference (pages 8-11)

The hypothesis that Ogawa et al.'s tape 2 is as same as metal plate 8 and is a permanent part of the finished package is not correct. The adhesive tape 2 of figs. 1 and 3 (the metallic plate 8 of fig. 4 which mentioned in the argument and which the examiner does not used in the rejections) could not be a permanent as alleged because it is used

“as an element-mounting member” “[o]n account to this, it is apprehended that, due to shear stress to be exerted at the time of bending work of the lead during the assembling step of the semiconductor package” (Ogawa et al.’s col. 2, lines 9-25 and col. 5, lines 44-45). Further, in the argument, the applicant tries to tie two different Ogawa et al.’s embodiments into one boat and repeat the *unacceptable* “[i]n the embodiment illustrated in Fig. 4, the support is a **metal** plate 8” (bold emphasized by the examiner) with clear intention of Ogawa to provide a strong permanent resin member that is arranged to support the die such that the support element is never removed (?); of which one of ordinary skilled in the art would wonder that the metal support element being permanent attached to the package does not short-circuit anything in that way of operational reliability?

It could be correct to state that “the support member would serve to support the die during wire bonding” but is not correct to state “and then would become part of the completed package” when the package is put on the board for surface mounted connection. It could be partially agreed that the resin member 2 *invented by Ogawa may be a permanent* structure (emphasized by appellant although the term “permanent” does not appear in Ogawa) of the formed semiconductor element 4 and the inner lead 1 of lead-frame 9 on the tape 2. However, the rejection is based, not on Ogawa’s invention, but on Ogawa recognized known prior art of fig. 5 wherein “the resin film 2, as an element-mounting member, joins a semiconductor element 4 with the resin type adhesive agent 3, thereby wire-bonding both the semiconductor element 4 and the inner lead 1 with a thin metal wire 5 to be electrically connected” (col. 2, lines 9-14). “The

adhesive force between the resin type adhesive agent and these metal materials is not necessarily sufficient" (Ogawa's col. 2, lines 20-21) so that resin film 2 being peeled off in the next step beyond Ogawa.

Appellant states "the support member serves as a support for the die 4 both during assembly and **when the lead frame is eventually used in a package**" (emphasized by appellant on page 9) and "the resin member 2 disclosed by Ogawa is very clearly intended to be a **permanent** structure and its removal would completely defeat the purposed of Ogawa reference" (emphasized by appellant on page 10) by relying on Ogawa's col. 2 lines 15-37 (on page 11) in which the last line is emphasized "improvement in the adhesive force between the resin member and the metal member is of paramount importance **on the operational reliability of the semiconductor package**. (*emphasis added* (by appellant))." Appellant further extracts MPEP 2143.01(V) that "if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose", then modifies MPEP with "as a matter of law, there can **not** be a suggestion or motivation to make the proposed modification" instead of "there is no suggestion or motivation to make the proposed modification" and states "the Examiner appeared to acknowledge that Ogawa himself contemplated permanently adhering the resin film 2 to the bottom surface of the lead frame". The Examiner does not agree to these, the response is as follow:

The Examiner never acknowledges that Ogawa himself contemplated permanently adhering the resin film 2 to the bottom surface of the lead frame because Ogawa only discloses partially a whole manufacturing process up to the stage of

forming a die onto a lead frame. The "importance on the operational reliability of the semiconductor package" at this stage is to protect the connection of the die on the lead frame from ""shear stress" or "thermal stress" or "moisture-adsorption". The adhesive tape is used for these functions to keep "the operational reliability" of the IC. In IC chip technology, the formed devices of Ogawa are endured further performing acts such as molding, packing, then stored and transported to other facility/apparatus on a spool of plastic where they are opened and assembled onto a printed circuit board. The adhesive tape does not permanently stayed as alleged. The Melton et al. reference is again an evidence of adhering tape being removing performed in prior art. Therefore, yes, **the lead frame is eventually used in a package** and no, the resin member 2 disclosed by Ogawa does not necessitate to be a **permanent** structure.

Further, MPEP 2143.01(V)'s the title is

V. THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR
ART UNSATISFACTORY FOR ITS INTENDED PURPOSE

And its second paragraph teaches:

"Although statements limiting the function or capability of a prior art device require fair consideration, simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function." In re Dance, 160 F.3d 1339, 1344, 48 USPQ2d 1635, 1638 (Fed. Cir. 1998) (Court held that claimed catheter for removing obstruction in blood vessels would have been obvious in view of a first reference which taught all of the claimed elements except for a "means for recovering fluid and debris" in combination with a second reference describing a catheter including that means. The court agreed that the first reference, which stressed simplicity of structure and taught emulsification of the debris, did not teach away from the addition of a channel for the recovery of the debris.).

The step of removing the adhesive tape after the step of forming the plastic casing is based on the teaching of Lin wherein both plastic casing and tape removing are taught to put the cased package onto board. The Lin reference teaches continuing process steps suitable for use after Ogawa wherein Ogawa's simplicity product of fig. 5 is further processed with Lin's plastic casing and tape peeling. In other words, the prior art as of Ogawa's fig. 5, a bared naked IC *with easier removed adhesion*, is continued satisfactorily for its intended purpose with the process of Lin to complete the process. Therefore, the removal of the support member (tape or plate as taught by Ogawa) does not defeat the purpose of the primary reference. Because Ogawa et al. is not as alleged, it is open to one of ordinary skill in the art to combine the teachings of the reference and Lin et al. as in the previous Final office action mailed 06/29/2006. The reasons for the combinations are stated. The tests for obviousness are also provided. In other words, the removing step of Lin would **not** defeat the purposed of Ogawa's prior art as alleged. The alleged "permanent" component of Ogawa until the step of wire-bonding both the semiconductor element 4 and the inner lead 1 with a thin metal wire 5 to be electrically connected could be accepted as in the above and does not teach against an adhesive coating for temporarily securing integrated circuit die to lead frame before being peeled off during processing" (Lin's figs 4-7).

In response to the last argument on pages 11-12. The term "substantially" is defined as essential or true in large part. MPEP defines as:

The term "substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. In re Nehrenberg, 280 F.2d 161, 126 USPQ 383 (CCPA 1960). The court held that the limitation "to substantially increase the efficiency of the compound as a copper

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extractant" was definite in view of the general guidelines contained in the specification. In re Mattison, 509 F.2d 563, 184 USPQ 484 (CCPA 1975). The court held that the limitation "which produces substantially equal E and H plane illumination patterns" was definite because one of ordinary skill in the art would know what was meant by "substantially equal." Andrew Corp. v. Gabriel Electronics, 847 F.2d 819, 6 USPQ2d 2010 (Fed. Cir. 1988).

Therefore, Lin's fig. 4 or fig. 9 and the according passage disclose "the leads is substantially flush with the associated side surface of the casing".

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Thanh V. Pham



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